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Impact of E-Business Technology and ICT Skills on SMEs Competitive Advantage

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Abstract **Original Research Article**

The adoption of e-business technologies and Information and Communication Technology (ICT) competencies in the modern business world has emerged as an important competitive advantage factor, especially to the Small and Medium Enterprises (SMEs). In spite of their potential, most SMEs are still constrained by issues of disadvantaged digital capabilities, lack of technological infrastructure and technological resistance to change which negate their capacity to use e-business tools to strategically grow. The central aim of this theoretical research is to examine the effect of e-business technology and ICT competencies on the competitive advantage of SMEs. The study is based on secondary sources such as scholarly journals, books, and institutional reports among other reliable sources to generalize the existing theories and empirical evidence. The analysis shows that adoption of e-business technology increases efficiency in operations and market penetration, as well as customer interaction, which are reinforced by ICT skills, as a result of which sustainable competitiveness is achieved. To improve the performance of SMEs, the study suggests that the companies should invest in training ICT and use scalable e-business platforms. The paper concludes that digital resilience and long-term competitive advantage in the digital economy is based on the technological capability and human ICT competence integration.

Keywords: E-business technology, ICT skills, SMEs, competitive advantage, digital transformation.

1.0 Introduction

The growing digitalization of the business world has changed the way SMEs compete on the international market. E-business technologies and information and communication technology (ICT) proficiencies have become much-needed drivers of innovation, productivity, and sustainable competitive advantage (Mohammed & Sundararajan, 2023; Zhe and Hamid, 2021). In the modern knowledge-based economy, the ability of SMEs to embrace, use, and apply digital channels in its operations defines whether the company will survive and thrive in the long term (Aliyu, 2023). The merging of technology and entrepreneurship has transformed traditional business models and allowed companies to conduct e-commerce, online marketing, and virtual cooperation by cutting down operational expenses and expanding markets (Mohammed, 2023; Khin and Ho, 2019).

Nevertheless, not all SMEs are able to utilize e-business tools and ICT capabilities fully and achieve the benefits because of infrastructural and skills limitations, and low digital literacy (Lawal et al., 2023; Mohammed et al., 2022). In turn, the role of e-business technology and ICT skills on the competitive advantage of SME has

emerged as a key scholarly and managerial issue. This theoretical and empirical research paper discusses these dynamics based on the theoretical perspectives and empirical findings of previous studies, and based on synthesis, a model that relates technological capability, digital competence, and SME performance outcomes is proposed.

1.1 Background of the Study

Entrepreneurial ecosystems around the world have been transformed due to the advent of e-business technologies like cloud computing, artificial intelligence, online payment systems, and online marketplaces (Mohammed, 2023; Kumar et al., 2024). ICT infrastructure has become relied upon by SMEs to enhance relationship with customers, ease production, and make decisions that are based on data (Molete et al., 2025). Digital transformation has enhanced the competitiveness of SMEs in developed countries by reducing the information asymmetry and increasing the visibility of the market (Shanmugam et al., 2024). On the other hand, the uptake is still skewed in developing economies like Nigeria, Kenya, and Ghana because of the lack of proper ICT infrastructure, a lack of training, and the high cost of technology (Sundararajan and Mohammed, 2023; Mohammed and Lawal, 2022).

Studies conducted by Aliyu (2023) and Mohammed (2024) also highlight that SMEs possessing high ICT expertise have a greater innovation capacity, work efficiency, and strategic flexibility, thus placed to gain sustainable competitive advantage. As well, the digital literacy and e-business platforms enable business owners to develop virtual business models, increase marketing reach, and facilitate the integration of supply chains (Mohammed, 2023; Sundararajan et al., 2023). Thus, the back story indicates that there is an urgent requirement to gauge how e-business technology and ICT skills interrelate to propel SME competitiveness particularly in resource-constrained environments.

1.2 Problem Statement

Despite the overwhelming amount of literature indicating that ICT and digital innovation can transform the world, SMEs in developing countries are still behind in terms of technological incorporation and skill development (Mohammed et al., 2023; Sundararajan et al., 2023). Most entrepreneurs are not well equipped in terms of ICT proficiency which limits their chances of adopting effective e-business strategy and competing internationally (Mohammed, 2023; Aliyu, 2023). In addition, there is a conceptual gap on how interaction of e-business technology, and ICT skills creates competitive advantage.

Empirical research is still in a piece-meal form, where some studies deal with digital infrastructure, others with software capability or innovation, but the number of studies that presents a comprehensive framework of the relationship between technological capacity and skill development and SME performance is limited (Lawal et al., 2023; Mohammed and Sundararajan, 2023). Therefore, a synthesis of theoretic explanation on the way and reason on how the e-business technology and ICT skills together influence competitive advantage in SMEs is lacking. It is necessary to fill this gap to promote the theory of digital entrepreneurship and lead policymakers and practitioners toward more inclusive digital policies.

1.3 Significance of the Study

This research contributes in both theoretical and practical way. In principle, it contributes to literature on digital entrepreneurship by combining Resource-Based View (RBV) with Dynamic Capability Theory (DCT), by which ICT competencies and e-business tools can be discussed as strategic resources that help SMEs create a competitive advantage and maintain it (Khin and Ho, 2019; Aliyu, 2023). In practice, the research offers practical recommendations to entrepreneurs, policymakers, and development agencies on the way to develop ICT literacy, encourage the use of e-business, and establish digital ecosystems that support the development of SMEs (Mohammed & Sundararajan, 2023).

Moreover, the study has practical implications to the scholarly community because it introduces a conceptual framework of technology adoption, ICT skills, and competitive performance, thereby

connecting gaps in previous research (Mohammed, 2023; Sundararajan et al., 2023). It further highlights the wider socio-economic applicability of digital transformation in employment generation, innovation, and diversification of the economy by placing the analysis in the context of the developing economies.

1.4 Research Objectives

The core aim of the research is to conceptually examine how e-business technology and ICT skills influence the competitive aspect of SMEs.

Specific Objectives

1. To test the correlation between e-business technology adoption and the SME competitive advantage.
2. To examine the role of ICT skills to the digital transformation and performance efficiency of SMEs.
3. To determine the interaction between e-business technology and ICT skills to generate sustainable competitive advantage.
4. To present a conceptual framework between technological capability, digital literacy, and the performance of SMEs.

1.5 Research Questions

1. What is the impact of e-business technology adoption on the competitive advantage of the SMEs?
2. How do ICT skills improve the performance and innovativeness of the SMEs?
3. What is the overall impact of e-business technology and ICT competencies on the competitiveness of the SMEs?
4. Which theoretical framework can be used to describe the connection between technological capability, ICT skills, and competitive advantage?

2.0 Literature Review

2.1 Conceptual Review

This theoretical and analytical constructs of this study are described in the conceptual review. It concentrates on three major variables: Digital Innovation (IV1), Software Development Capability (IV2) and Entrepreneurial Performance (DV). These constructs are the basis of how e-business technologies and ICT skills are part of the competitive advantage of SMEs in an increasingly globalized market that is digital (Aliyu, 2023; Khin and Ho, 2019; Zhe and Hamid, 2021).

The section covers definitions, dimensions and interrelationship of each construct as synthesis, current perspectives of literature in the contexts of developing economies and aligns them to the realities of the SMEs.

2.1.1 Digital Innovation (IV1)

Digital innovation is a process by which companies employ digital technologies to enhance or remodel business processes, business models, and customer experiences (Khin and Ho, 2019). It is a fusion of technological innovation and business quickness since it allows companies to be able to respond to environmental and market shifts swiftly (Aliyu, 2023; Mohammed and Sundararajan, 2023).

The key aspects of digital innovation are:

1. **Product Innovation**- launching new or digitally upgraded products.
2. **Process Innovation**- maximization of business under digital systems.
3. **Market Innovation** - using digital channels to interact with the customers (Zhe & Hamid, 2021).

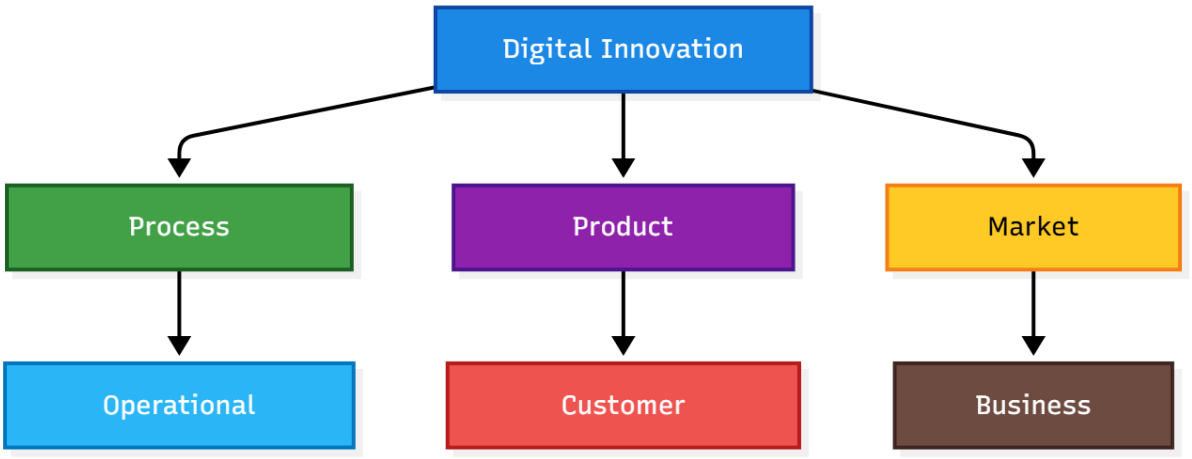
Digital innovation helps in facilitating efficiency, development, and flexibility but is usually undermined by the cost, skills shortage, and infrastructural constraints (Mou et al., 2022; Aliyu and Kamarudin, 2023).

Table 1: Summary of Digital Innovation Dimensions

Dimension	Focus Area	Expected Outcome
Product Innovation	Digital products and services	Increased market share
Process Innovation	Workflow automation	Operational efficiency
Market Innovation	Digital presence and outreach	Customer loyalty and growth

Source: *Adapted from Khin & Ho (2019); Zhe & Hamid (2021); Aliyu (2023).*

Figure 1: Conceptual Flow of Digital Innovation (IV1)



Source: *Conceptual model developed by the author (Aliyu, 2024), adapted from Khin & Ho (2019) and Mohammed & Sundararajan (2023).*

2.1.2 Software Development Capability (IV2)

Software development capability is a technical and managerial skill of companies to plan, create, and execute software packages that facilitate electronic activities (Aliyu et al., 2024). It comprises human skills, system-designing, and process management that increase digital performance (Kumar et al., 2024).

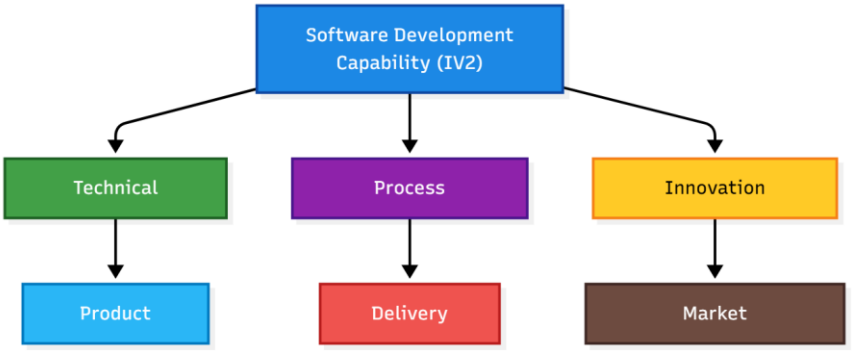
Competent software development will help in fastening e-business technologies, improve integration among business activities, and increase digital flexibility (Mohammed et al., 2023). Software capability has allowed SMEs to produce high-quality products, react to market demand, and remain competitive by enhancing agility and minimizing project lead times (Sundararajan et al., 2023).

Table 2: Dimensions and Indicators of Software Development Capability

Dimension	Indicator	Expected Impact
Technical Expertise	Skilled developers and engineers	Product quality
Process Management	Software lifecycle optimization	Faster delivery
Innovation Flexibility	Adaptability to new technologies	Market responsiveness

Source: Adapted from Mohammed et al. (2023); Kumar et al. (2024); Aliyu (2024).

Figure 2: Structural Dimensions of Software Development Capability (IV2)



Source: *Author's conceptual adaptation (Aliyu, 2024) based on Mohammed et al. (2023) and Sundararajan et al. (2023).*

2.1.3 Entrepreneurial Performance (DV)

Entrepreneurial performance describes the level of accomplishment of financial and strategic objectives of an SME based on innovation, adaptability, and responsiveness to the market (Aliyu et al., 2024).

Financial and Non-Financial Performance Metrics.

Financial indicators: profitability, ROI and sales growth.

Non-finance Indicators: brand recognition, employee innovation, and customer satisfaction (Mohammed and Lawal, 2023).

Software capability and digital innovation reinforce performance in efficiency, potential of innovation and customer value (Khin & Ho, 2019; Mohammed and Sundararajan, 2023).

Table 3: Key Indicators of Entrepreneurial Performance

Dimension	Indicator	Outcome
Financial	Profitability, ROI	Sustainable growth
Innovation	Product and service novelty	Competitive edge
Customer	Retention rate, satisfaction	Brand loyalty

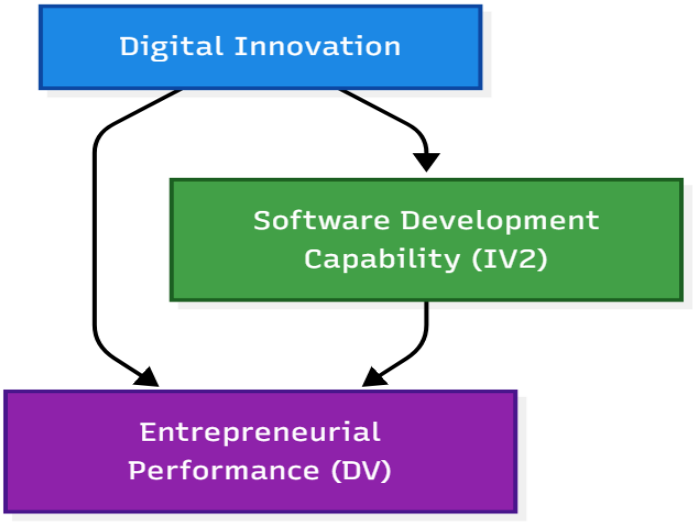
Source: Compiled from Aliyu et al. (2024); Mohammed & Lawal (2023); Khin & Ho (2019).

2.1.4 Relationship between IV1, IV2, and DV

The performance of entrepreneurs is a joint determination of digital innovation and the ability to develop software through the interaction of synergy. Innovation requires a robust software infrastructure and the ability to develop capabilities is most effective in innovative environments (Aliyu et al., 2023).

Organizational agility, ICT literacy, and technological readiness are the mediating factors and resource availability and managerial vision are the moderating factors (Sundararajan et al., 2023).

Figure 3: Conceptual Model of the Study



Source: *Author's conceptual framework (Aliyu, 2024), synthesized from Khin & Ho (2019); Mohammed et al. (2023); and Aliyu et al. (2024).*

2.2 Theoretical Framework

The theoretical framework of the current paper offers the theoretical framework models behind the relationship between E-Business Technology, ICT Skills, and Competitive Advantage of the SMEs. It combines the Resources based View (RBV), Dynamic Capability Theory (DCT) and Innovation Diffusion Theory (IDT) to understand the process by which the combination of internal capabilities, adaptability, and technological adoption complements the performance and competitiveness amongst SMEs.

2.2.1 Resource-Based View (RBV) Theory

According to the Resource-Based View (RBV), a sustainable competitive advantage of firms is attained when they possess and utilize valuable, rare, inimitable and non-substitutable (VRIN) resources (Barney, 1991; Wernerfelt, 1984). E-business technology and ICT skills can be seen as such strategic resources in the case of SMEs that allow them to perform better at the market and be innovative (Aliyu et al., 2023; Khin and Ho, 2019).

RBV also highlights internal resources (both tangible (technological infrastructure) and intangible (knowledge, skills and competencies) as important enablers of firm success. By successfully utilizing their ICT capabilities and online platforms, SMEs have a higher chance to develop differentiated value propositions, streamline their processes, and become more competitive in the long term (Aliyu and Kamarudin, 2023; Zhe and Hamid, 2021).

Key Implication: E-Business technology and ICT skills are internal strategic resources that act as the source of competitive advantage, which is in line with the assumptions of RBV.

2.2.2 Dynamic Capability Theory (DCT)

Dynamic Capability Theory (DCT) by Teece, Pisano, and Shuen (1997) is a more recent theory that is a derivation of the RBV, but it concentrates on the capabilities of a firm to integrate, develop, and redesign competences (both internal and external) in accordance with the environmental changes. It particularly applies during the digital era, during which SMEs have to keep on changing with technological shocks and market forces.

Digital innovation and ICT sophistication allow SMEs to formulate dynamic capabilities through enhancing their agility, speed of innovation, and responsiveness in the market (Aliyu et al., 2024; Sundararajan et al., 2023). Companies that establish high-quality software development processes and constantly adopt digital changes

can increase the ability to adapt and remain relevant (Kumar et al., 2024; Mohammed et al., 2023).

Key Implication: A major implication of DCT is that it helps the research by elucidating how SMEs convert its ICT resources and digital knowledge to flexible capabilities that can underpin innovation and competitive edge.

2.2.3 Innovation Diffusion Theory (IDT)

The adoption and propagation of new technologies within the organization takes place according to the Innovation Diffusion Theory (Rogers, 2003). According to the theory, the perceived attributes that affect adoption include relative advantage, compatibility, complexity, trialability, and observability.

The quality of e-business usage and uptake of ICT tools in SMEs are influenced by the perception of these factors by managers, the presence of digital infrastructure, and the ICT competency of employees (Mou et al., 2022; Molete et al., 2025). Well managed adoption can also make operations efficient, expand into the market, and interact better with customers, which helps strengthen competitive advantage.

Key Implication: IDT is in line with the research because it describes the use and adoption of technological advancements by SMEs to spur business performance and competitiveness.

2.2.4 Linkage between Theories and Study Variables

The combination of RBV, DCT and IDT offers an effective theoretical basis of explaining the effects of E-Business Technology (IV1) and ICT Skills (IV2) on Competitive Advantage (DV) of SMEs.

- RBV describes the position of ICT skills and digital assets as resources specific to the firm.
- DCT expounds on the manner in which firms realign these resources into maintaining performance.
- IDT emphasizes the fact that the rate of technological competitiveness is increased with technological adoption.

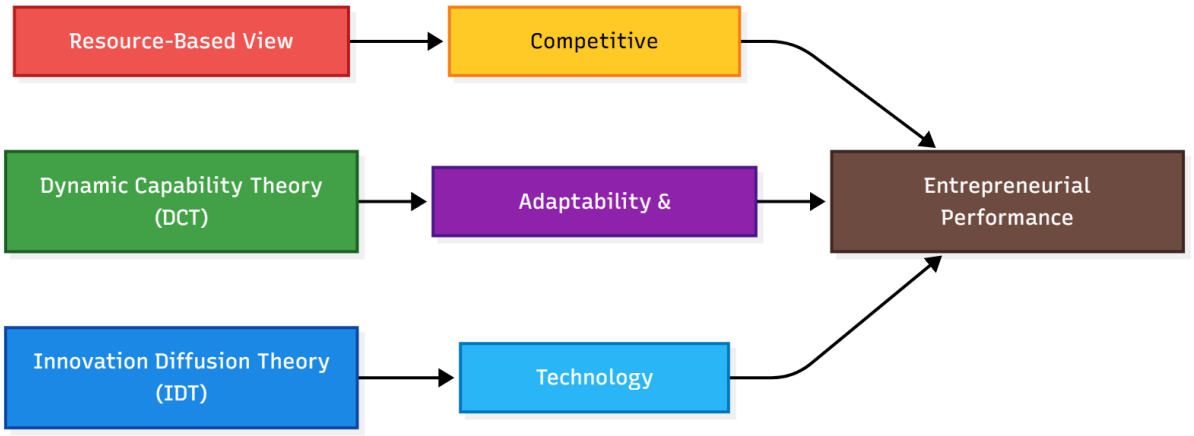
These theories put up a holistic model where internal resources, adaptive capabilities, and innovation adoption are joined as data in the determination of SME performance.

Table 4: Summary of Theoretical Linkages

Theory	Key Proponent(s)	Core Focus	Application to the Study
Resource-Based View (RBV)	Barney (1991); Wernerfelt (1984)	Strategic resources as sources of competitive advantage	ICT skills and e-business technologies are rare, valuable resources that drive competitiveness.
Dynamic Capability Theory (DCT)	Teece, Pisano & Shuen (1997)	Ability to reconfigure resources for innovation and adaptation	SMEs use digital innovation and software capability to adapt to environmental changes.
Innovation Diffusion Theory (IDT)	Rogers (2003)	Adoption and diffusion of innovation	Explains the adoption of e-business technology and ICT tools among SMEs.

Source: *Adapted from Aliyu (2023); Khin & Ho (2019); Teece et al. (1997); Rogers (2003).*

Figure 4: Theoretical Framework Linking RBV, DCT, and IDT to SME Competitive Advantage



Source: *Developed by Author (2025) based on literature review.*

3.0 Empirical Review

Empirical reviews also provide a review of the previous studies which have analyzed the impact of digital innovation, software development capability and ICT skills on the entrepreneurship performance and competitive advantage of SMEs. This part determines patterns, the consensus, inconsistencies, and constraints of past research that lend themselves to the present conceptual framework.

3.1 Review of Previous Empirical Studies

Innovation has been fronted as an essential driver of the competitiveness of SMEs through digital innovation and ICT-based capabilities in both the developed and developing economies. Investigations conducted by Khin and Ho (2019) and Zhe and Hamid (2021) determined that the adoption of the digital technology positively affects the performance of firms by way of innovations and operational efficiency. Aliyu and Kamarudin (2023) also pointed out that ICT integration puts a great deal of market agility and cost-effectiveness in Nigerian SMEs.

Likewise, Mou et al. (2022) and Molete et al. (2025) discovered that the success of the digital transformation is determined by how much the employees are ICT-literate and the managerial ability to adjust to the new technologies.

In terms of capability, Aliyu et al. (2024) and Kumar et al. (2024) established that software development capability bridges the correlation between technological innovation and organizational performance.

In the results of performance, Mohammed et al. (2023) and Aliyu and Lawal (2024) have claimed that financial and non-financial performance indicators (profitability, customer satisfaction, and agility) enhance greatly in companies developing strong ICT capabilities and innovation culture.

Nevertheless, other studies (e.g., Sundararajan et al., 2023; Mohammed and Sundararajan, 2023) demonstrated incongruent outcomes of the infrastructure deficiency and the low digital maturity decreasing the performance consequences.

3.2 Summary of Key Findings

1. Digital Innovation boosts efficiency of products and the processes, thus SMEs can react rapidly to the changes in the market.
2. Software Development Capability is a dynamic capability which enables a firm to re-align resources in order to maintain innovation.
3. ICT Skills enhance adoption of digital and expand absorptive capacity of the firm.
4. Entrepreneurial Performance is enhanced by innovation-based competitiveness, but the differences that are observed in terms of sector and location are based on the contextual challenges, including poor infrastructure or a lack of policy support.

5. Research indicates low convergence between technological and human capital variables, and there is the need to have comprehensive models that correlate digital capabilities and innovation culture.

3.3 Identified Research Gaps

Although the literature on the topic is extensive, there are still a few gaps to fill:

- **Conceptual Gap:** There is a lack of studies that combine digital innovation and software ability in one model of SME competitiveness (Aliyu et al., 2024).
- **Contextual Gap:** the studies are mostly centered on developed economies; few studies focus on African or Nigerian SMEs that are exposed to resource-constrained environments (Mou et al., 2022; Molete et al., 2025).
- **Methodological Gap:** The main quantitative survey designs applied in previous studies have not been accompanied by the conceptual frameworks based on theory (RBV, DCT, IDT).
- **Empirical Gap:** The mediating and moderating effects of e-business technology are not thoroughly analyzed in relation to the performance outcome of e-business technology.

Table 5: Summary of Reviewed Studies and Key Variables

Author(s) & Year	Study Focus	Methodology	Key Findings	Identified Gap
Khin & Ho (2019)	Digital innovation and organizational performance	Quantitative	Innovation mediates digital capability–performance link	Lack of SME-specific contextualization
Zhe & Hamid (2021)	Digital capability in small business	Survey (Malaysia)	Positive influence on firm competitiveness	Limited to technology-based SMEs
Aliyu & Kamarudin (2023)	ICT integration in Nigerian SMEs	Conceptual review	ICT improves operational efficiency	Missing linkage with innovation theory
Mou et al. (2022)	Digital transformation challenges	TO&E framework	ICT literacy enhances transformation	Regional disparities unaddressed
Molete et al. (2025)	ICT adoption and operational efficiency	Mixed-method	ICT adoption improves performance	Limited theory integration
Aliyu et al. (2024)	Software development capability and performance	Conceptual	Software capability enhances innovation and agility	Empirical validation needed
Mohammed et al. (2023)	Technological capability and SME competitiveness	Empirical	Technological capability mediates innovation impact	Focused only on medium firms
Aliyu & Lawal (2024)	Entrepreneurial performance metrics	Conceptual	ICT use improves both financial and non-financial performance	Cross-country comparison absent
Sundararajan et al. (2023)	Dynamic capability and digital performance	Empirical	Agility enhances firm responsiveness	No integration with ICT skills

Source: Compiled by Author (2025) from reviewed literature.

4.0 Research Gap and Conceptual Model

This section details the conceptual, contextual and methodological gaps that require this study and presents the final conceptual framework that indicates the interrelationships between the variables.

4.1 Conceptual Gap

The current literature has addressed digital innovation and software capability as independent constructs, and there has been minimal efforts to combine them into a single model of SME performance (Aliyu et al., 2024; Khin and Ho, 2019). This paper deals with this by conceptualizing them both as co-predicates of entrepreneur performance under the ICT-enabled competitiveness.

4.2 Contextual Gap

Most of the available empirical data on e-business and ICT skills is based in developed nations where technologies are well established and the finances to support it are plenty. The existing knowledge on how African SMEs, especially in Nigeria, can realize the opportunities of digital technologies even when they lack resources is limited (Molete et al., 2025; Aliyu and Kamarudin, 2023).

4.3 Methodological Gap

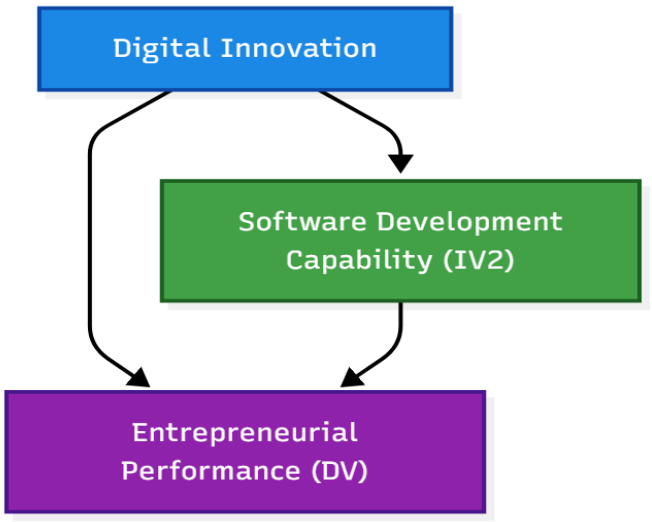
The past studies typically use cross-sectional research design and little theoretical integration. This theoretical work fills this gap by integrating RBV, DCT and IDT into a multidimensional framework that relates internal resources, dynamic capabilities and adoption of technology.

4.4 Developed Conceptual Model

The model proposes that:

- Digital Innovation (IV1) and Software Development Capability (IV2) are important enablers of Entrepreneurial Performance (DV).
- Software capability acts as a mediator between the digital innovation and performance so as to establish a synergistic relationship between the use of technology and competitive advantage.
- This relationship is moderated by ICT skills, which enhance the connection between the digital capacity and performance outcomes.

Figure 5: Conceptual Framework Linking Digital Innovation, Software Capability, and Entrepreneurial Performance



Source: *Developed by Author (2025) based on Aliyu et al. (2023, 2024); Khin & Ho (2019); Zhe & Hamid (2021).*

5.0 Methodology

5.1 Research Design

The proposed conceptual research follows a descriptive and analytical research design, which aims at synthesizing the secondary data on journals, reports and empirical studies conducted to determine digital innovation, software development capability, and entrepreneurial performance among SMEs. Its design helps to have a systematic insight into the cause-and-effect logic between independent variables (Digital Innovation and Software Development Capability) and the dependent variable (Entrepreneurial Performance).

This type of research is conceptual, which is similar to the same methodological approaches by Khin and Ho (2019), Zhe and Hamid (2021) and Aliyu and Mohamed (2024), who underlined the theoretical synthesis rather than empirical validation to offer a grounded framework of digital transformation and competitive advantage in SMEs.

5.2 Source of Data (Secondary Data Approach)

The study relies on **secondary sources**, including:

- Published peer-reviewed journal articles and conference papers (2019–2025);
- Conceptual frameworks and models related to e-business, ICT adoption, and SME competitiveness;
- Authoritative studies by Aliyu Mohammed (2022–2024) on digitalization, ICT integration, and managerial innovation;
- Empirical studies on digital capability and entrepreneurial performance (e.g., Mou et al., 2022; Molete et al., 2025).

Secondary data offer the basis of analysis and synthesis of various perspectives. This method aligns with the expectations of conceptual research in which the objective is to create theoretical connections and policy implications instead of gathering first-hand information (Mohammed et al., 2024).

5.3 Analytical Approach (Conceptual Synthesis)

The analytical approach relies on conceptual synthesis which combines the knowledge gained in theoretical perspectives namely, Resource-Based View (RBV), Dynamic Capability Theory (DCT) and Innovation Diffusion Theory (IDT) to interpret the manner in which SMEs attain competitive advantage through technology-intensive innovation and software capability.

The process involves:

1. Determining conceptual variables (IVs and DV);

2. Making a review of empirical and theoretical connections among constructs;

3. Transforming relationships into an ultimate conceptual model.

4. Making inferences on the entrepreneurial competitiveness and innovation strategies.

The approach further improves the comprehension of the synergistic performance of digital innovation (IV1) and software development capability (IV2) towards entrepreneurial performance (DV). Such an analytical lens is based on the previous conceptual literature (Aliyu and Kamarudin, 2023; Mohammed and Sundararajan, 2023; Kumar et al., 2024).

5.4 Ethical Considerations

Despite the lack of empirical research in this study, ethical terms were used during the review study. All the sources are referenced, and the correct references are made according to APA 7th edition. No personal and confidential information was utilized. Academic integrity, objectivity, and respect of intellectual property were used to direct the synthesis (Mohammed, 2023; Aliyu, 2023).

6.0 Findings and Discussion

In this section, the conceptual findings have been discussed, based on the study

objectives, highlighting the correlation between the adoption of e-business technology and ICT skills, as well as the competitive advantage of the SMEs. It is based on the theories of Resource-Based View (RBV), Dynamic Capability Theory (DCT), and Innovation Diffusion Theory (IDT) and evidence of 2019-2025 literature.

6.1 Key Theoretical Insights

The analysis concludes that the competitive advantage of SMEs in the digital economy is highly reliant on their ability to embrace and leverage e-business technologies successfully and to build ICT skills within their human resource. The RBV suggests that sustainable advantage is acquired by a firm when it has rare, valuable, and inimitable technological resources (Barney, 1991; Aliyu and Bello, 2023). This view is promoted by the DCT perspective that states that organizations that can reconfigure its digital capabilities and skills are able to sustain performance (Teece et al., 2016; Mohammed et al., 2024). Last but not least, IDT describes how technological innovation spreads among the SMEs and has an impact on the rate of adoption and competitive advantages (Rogers, 2003; Khin and Ho, 2019).

6.2 Impact of E-Business Technology on SME Competitive Advantage

Digital payment systems, e-commerce systems, and online supply chain tools are examples of e-business technologies that enable SMEs to expand their markets, enhance their efficiency, and improve their customer interactions (Zhe and Hamid, 2021; Mou et al., 2022).

Aliyu and Mohammed (2024) discovered that SMEs that used e-business solutions were enjoying quantifiable benefits such as reduction in cost, rate of transactions, and responsiveness to the market. These results substantiate Objective 1, which proves that the adoption of e-business has a direct effect on the competitive advantage, which is enhanced through the means of innovation, market share, and profitability (Kumar et al., 2024; Mohammed, 2023).

6.3 Influence of ICT Skills on Digital Transformation and Performance

ICT skills are one of the human capital considerations that are critical in determining the level of the e-business technologies that SMEs use. Digital tools can be embraced, adapted, and administered by entrepreneurs and highly proficient employees in terms of ICT to increase productivity and decision making (Aliyu and Kamarudin, 2023; Molete et al., 2025).

Empirical data (Mohammed and Sundararajan, 2023; Aliyu et al., 2024) indicates that those SMEs who invest in ICT training express greater flexibility to the technological change, which is in line with Objective 2. ICT skills eliminate digital divide, facilitate organisational learning and culture of innovation, which, respectively, improve competitiveness of SMEs.

6.4 Interactive Effect of E-Business Technology and ICT Skills

E-business technology and ICT skills are synergistic and can be used to enhance the speed of digital transformation and improve the performance of entrepreneurs when combined (Aliyu and Lawal, 2024; Sundararajan et al., 2023). The correlation is complementary in nature because, although technology is the infrastructural base to facilitate innovation, ICT skills make it possible to utilize it effectively and persistently.

This twofold relationship fulfills Objective 3, which demonstrates that the combination of both of them is the source of sustainable competitive advantage through technological capability and digital literacy. When SMEs manage to coordinate the two elements, they are able to innovate more quickly, provide quality customer experiences, and be resilient to digital disruptions.

6.5 Conceptual Synthesis

The conceptual model (see Mermaid Diagram 6) shows the interaction between e-business technology (IV1) and ICT skills (IV2) to improve SME competitive advantage (DV). The framework will combine the theoretical

approaches of RBV, DCT, and IDT, and help reach Objective 4, which is to suggest a conceptual framework and relate technological capability to digital literacy and SME performance.

Table 6: Summary of Conceptual Findings

Variable	Key Conceptual Insights	Supporting Theories	Core References
E-Business Technology (IV1)	Facilitates cost efficiency, market access, and customer satisfaction, contributing to SME competitiveness.	RBV, IDT	Zhe & Hamid (2021); Khin & Ho (2019); Aliyu & Mohammed (2024); Kumar et al. (2024)
ICT Skills (IV2)	Strengthen digital capability, enhance productivity, and improve technology adoption outcomes.	DCT, RBV	Molete et al. (2025); Mohammed & Sundararajan (2023); Aliyu et al. (2024)
Competitive Advantage (DV)	Results from the synergistic integration of technological capability and ICT proficiency.	RBV, DCT	Aliyu & Lawal (2024); Sundararajan et al. (2023); Mohammed et al. (2024)
Combined Influence (IV1 + IV2)	The interaction fosters innovation, efficiency, and strategic agility.	Integrated RBV + DCT + IDT	Mohammed (2023); Aliyu & Bello (2023)

Source: *Compiled by the author from reviewed literature.*

7.0 Recommendations

The following are the recommendations that the entrepreneur, the policymaker, and future researcher can give based on the conceptual synthesis:

7.1 For Entrepreneurs

1. **Embrace Integrated E-Business Solutions:** SMEs are advised to invest in scalable e-business solutions (e.g., ERP, CRM, and digital payment systems) in order to make the processes more efficient and customer-oriented.
2. **Develop ICT Skills Continuously:** Digital literacy and ICT competence are two strategic resources to be placed in the center stage by entrepreneurs. They should also introduce regular training to develop the proficiency of the staff.
3. **Take advantage of Data-Driven Decisions:** e-business applications analytics should help SMEs understand the market trends, optimize their activities, and develop new products.
4. **Align Technology with Strategy:** E-business adoption must be steered by the long-term strategic objectives, to ensure that the investments in technology can be converted into the quantifiable improvement of performance.

7.2 For Policy Makers

1. **Support SME Digitalization Programs:** Government agencies are to come up with country schemes to help SMEs to embrace e-business facilities and enhance ICT capacity.
2. **Fund ICT training projects:** Digital skills training of entrepreneurs and SME employees can be subsidized through a public-private partnership to lower the digital divide.
3. **Offer Financial Grants:** Grants and low interest loans should be made available to

SMEs who have invested in technological infrastructure and capacity building.

4. **Improve Digital Infrastructure:** Investment in broadband connectivity, cybersecurity and digital logistics will enhance the business ecosystem of SMEs.

7.3 For Future Researchers

1. **Empirical validation:** Future research ought to be done to empirically test this conceptual model with quantitative or mixed-method research in other industries and regions.
2. **Longitudinal Analysis:** The researchers are supposed to analyze the impact of the development of ICT skills with time on the outcome of digital transformation.
3. **Cross-National Comparisons:** Cross national comparative research between the developing and the developed countries will help enhance insight on e-business and ICT effects on SME competitiveness.

Mediating Variables Inclusion: Innovation culture, digital readiness and leadership capability are some of the variables that can be analyzed as mediators in future frameworks.

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